

ORIGINAL ARTICLE

RETROSPECTIVE ANALYSIS OF RESPIRATORY MEDICATION THERAPY ADHERENCE CLINIC (RMTAC) IN THE MANAGEMENT OF PAEDIATRIC BRONCHIAL ASTHMA.

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Abstract

Background: Paediatric respiratory medication therapy adherence clinic (RMTAC) serves as an excellent platform for patient-centred care. In most healthcare settings, pharmacists and physicians often do not readily communicate because they work independently and in parallel, rather than collaboratively.

Objective: The present study aimed to focus on the roles of RMTAC to complement clinical paediatrics management of bronchial asthma on the provision of clinical assessment, counselling and monitoring.

Methods: This retrospective study involved data retrieval of paediatric bronchial asthma patients seen by paediatric RMTAC clinic and those without RMTAC, from 1 January 2019 until 31 December 2020. The study variables of interest were collected, collated and compared, which include the demographic particulars (age, serial weight and height) and information on the assessment of therapy adherence and inhaler technique.

Results: A total of 87 clinical records of paediatric bronchial asthma were retrieved for this study (40 with no RMTAC vs. 47 with RMTAC). At the first visit, majority had well controlled asthma ($n=37$, 42.5%) with low medication adherence ($n=26$, 29.9%). The assessment of metered-dose inhaler technique was significantly poor without RMTAC monitoring, $\chi^2=43.54$, $df=1$, $p<0.001$. Univariate analysis determined that age (OR=1.16, 95% CI=1.0-1.3) and good MDI technique (OR=6.4, 95% CI=1.35-30.14) were significantly associated with good asthma control.

Conclusion: Our paper highlights the importance of paediatric RMTAC to complement medical management of bronchial asthma. We highly recommend paediatric RMTAC service to be strengthened and introduced throughout all healthcare facilities in Malaysia to improve healthcare delivery.

Keywords: Pharmacists, public health, counseling, pediatrics, referral and consultation, health care costs.

Introduction

In Malaysia, medication therapy adherence clinics (MTACs) are established for pharmacists to monitor patients' medication regimes, educate patients, and address medication adherence-related problems.^[1-4] Patients are mainly provided with disease and medication counselling during MTAC sessions.^[3] Evaluation of the impact of MTAC has shown improvement in patients' adherence.^[5-10] Furthermore, there is evidence of cost-effectiveness in pharmacist-run clinics for the management of chronic illness as compared to the usual medical clinics.^[9-11]

As the MTAC setting provides a good platform for pharmacists to interact with patients, especially those with chronic illness, it offers opportunities for patient-centred care to be practised and studied. In most healthcare settings, pharmacists and physicians often do not communicate well because they largely work independently and in parallel with each other, rather than collaboratively. Furthermore, there can be challenges in communication due to differences of opinion on interprofessional role, reluctance to challenge the other profession, different work schedules, and different information priorities. Therefore, it is important that physicians and pharmacists have good rapport and communication as it is essential to move beyond transactional interactions to safeguard optimal therapeutic outcomes for patients.

This research aimed to foundationally understand how pharmacists and physicians independently manage outpatient paediatric bronchial asthma and assess their interprofession reciprocity. The findings from this study may potentially improve the deficiency identified within the system, hence improve healthcare delivery and eventual patients' health outcome.

Methodology

This retrospective cohort analysis involved primary and secondary data retrieval from (i) paediatric respiratory medication therapy adherence clinic (PRMTAC) records and (ii) medical paediatric records of outpatient bronchial asthma seen from 1 January 2019 until 31 December 2020 in Hospital Tuanku Fauziah, Perlis, Malaysia. A universal sampling was employed for PRMTAC records, whereas convenient sampling was used in the selection of medical paediatric records.

Data of interest were collected and collated to compare between specific variables of interest between outpatient paediatric bronchial asthma who underwent PRMTAC assessment vs. without PRMTAC assessment (i.e. those who only underwent medical paediatric follow-up during the study period). Data collected include the patients' demographic profile (i.e. age, serial weight and height, serial peak expiratory flow rate readings), type of medication used, and the nature and extend of assessments and counselling performed by PRMTAC vs. medical paediatrics at each clinic visit throughout a year-long follow-up.

The items included in the review for assessment include: assessment of therapy adherence, assessment of inhaler technique, and assessment of interval symptoms. Presence of any particular assessment during clinic visit was given a numerical rating of either 0 (absence) or 1 (present). The cumulative mark was subsequently derived from the total number of specific assessment item or counselling item, divided by the total number of consultations received throughout the year. Therefore, a cumulative score of 1 (one) indicates extremely good assessment or counselling of that particular item, whereas a score of 0 (zero) indicates the reverse.

Ethical clearance

The study was registered with the National Medical Research Register of the Ministry of

Health Malaysia (NMRR-21-129-58358) and received ethical clearance from the Medical Research and Ethics Committee of the Ministry of Health, Malaysia (KKM/NIHSEC/P21-341(4).

Results

There was a total of 87 medical records retrieved for the study; 40 (46.0%) records were of medical outpatient paediatric bronchial asthma without PRMTAC service vs. 47 (54.0%) patient records with ongoing PRMTAC service. Gender distribution was relatively balanced with 45 (51.7%) male, and 42 (48.3%) female. Malay was the commonest ethnic at 83 (95.4%), followed by Chinese ($n=2$, 2.3%) and Siamese 2 (2.3%).

The patients' mean age was 7.2 ± 3.07 years old while the mean age at which the diagnosis of bronchial asthma was made was at 5.7 ± 2.85 years old. The commonest device used among outpatient paediatric bronchial asthma was MDI/Aerochamber at 47 (54.0%), followed by MDI alone without spacer (33, 37.9%), and MDI/Optichamber and Turbuhaler at $n=1$ (1.1%), respectively. The commonest medication used was Budesonide/Salbutamol combination (66, 75.8%), followed by Salbutamol only (13, 14.9%), Fluticasone/Salbutamol (6, 6.9%) and Symbicort (1, 1.1%). On average, patients with bronchial asthma underwent 2.1 ± 1.18 outpatient medical visits yearly.

At the first medical visit (regardless of PRMTAC status), majority had well controlled asthma (37, 42.5%), followed by partially controlled (32, 36.8%) and poorly controlled (13, 14.9%). Majority were categorised with low adherence to prophylactic corticosteroid (26, 29.9%), followed by high adherence (21, 24.1%) and medium adherence (5, 5.7%). Table 1 below describes the distribution of assessment of adherence and metered-dose inhaler (MDI) technique during routine follow-up visits. We have also performed logistic regression to determine significant factors

associated with good asthma control by the last clinic visit of the year.

Detailed assessment throughout a year-long follow-up visits between patients undergoing paediatric PRMTAC vs. no PRMTAC were performed. We found that the comparative scores for the assessment of interval symptoms and counselling were significantly lower for patients who were not subjected to PRMTAC service (Table 3).

With regards to MDI technique assessment, a vast majority of patients were not properly assessed during routine outpatient medical paediatric visit (not receiving PRMTAC service) (Table 4).

Discussion

PRMTAC service displayed significantly better scores in terms of the provision of assessment of asthma control and intervals symptoms than the non-PRMTAC counterpart. Specific criteria need to be fulfilled when assessing patients with bronchial asthma including the childhood asthma control test (C-ACT), asthma symptoms control, peak expiratory flow rate and inhaler technique. We found that these clinical assessment were inadequately assessed by the medical paediatric team during routine outpatient appointments as compared to the more inclusive assessment carried out by PRMTAC service. Previous research on severe asthma, especially in children, suggests a structured and systematic approach to evaluate the disease control and therapy adherence.^[12]

Lack of proper assessment of adherence and inhaler technique, particularly among non-PRMTAC patients may result in poor technique and inadequate therapeutic relief. On the other hand, correct administration would significantly improve drug delivery to the targeted organ and produce the required effects. A study by Thanimalai, Shafie, Hassali, and Sinnadurai (2018)^[11] found that the odds of good asthma

control was three times more likely with pharmacist intervention than without. Therefore, this highlights the important role played by PRMTAC service in the monitoring, counselling and assessment of paediatric bronchial asthma.

We found that good inhaler technique, older age and PRMTAC status were predictive of good asthma control at the final clinic visit. Patients with correct inhaler technique were six times more likely to attain good asthma control as compared to patients with poor technique. The result was well supported by a study that assessed the effect of correct inhaler use and adherence on asthma control.^[13] Similarly, another study conducted among asthmatic patients attending Sultan Qaboos University Hospital in Oman reported that 93.5% of patients with correct inhaler technique and good compliance to medication demonstrated superior levels of asthma control.^[14]

Our study showed that an increase in age by every one year had 1.2 times higher odds for good asthma control. This is in line with a study that investigated the age-related differences in asthma control among 572 children aged 4 to 16 years old.^[15] They reported that the level of asthma control was statistically satisfactory in older children, by 44%, 56% and 66% for children aged 7-9, 10-12 and 13-16 years respectively. Poor asthma control in younger children may be attributed to the high incidence of symptomatic viral infection which interferes with treatment.

The present study found that good asthma control was achieved in patients who were not recruited into PRMTAC service. This can be explained by the nature of medical referral to PRMTAC that constitutes problematic patients. Patients with deemed good asthma control were not eligible to be enrolled into PRMTAC service.^[16] Patients were referred to PRMTAC if they fulfilled at least one of the following criteria: C-ACT score of less than 19, patients with uncontrolled asthma according to GINA protocol, patients with

frequent asthma exacerbation according to GINA protocol, poor technique or low medication adherence. PRMTAC services offer extra monitoring as the pharmacists will provide appropriate education and counselling, as well as assessing inhaler technique and adherence to help patients attain better clinical outcome.^[2]

Multivariate analysis demonstrated that good inhaler technique is the only factor significantly associated with good asthma control after adjusting for age, adherence and the presence of PRMTAC service. This showed that improper inhaler technique negatively affects asthma control due to inadequate drug delivery that results in poor drug efficacy, hence frequent hospitalization.^[17-19] This finding was supported by a study among 330 Egyptian asthmatic children aged 2-12 years old that found better asthma control to be significantly observed among patients with correct inhalation technique.^[20] Similarly, Giraud *et al.* reported that training with pharmacists improved the optimal inhalation technique from 24% to 79%.^[21] Thus, pharmacists are positioned to train and assess inhaler technique, provide asthma education and improve adherence to ensure optimal clinical outcome is achieved.

Conclusion

Therefore, PRMTAC service is definitely essential in the outpatient management of paediatric bronchial asthma, particularly among those with partially controlled and poorly controlled illness. We strongly advocate that healthcare providers to move beyond task-based work towards a more collaborative approach and support interprofessional shared decision-making to improve patient care.

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literature search. KK, NAM and NMR were involved with data acquisition, KK performed data analysis and statistical analysis. All authors were involved in early manuscript preparation. KK, AWC and AA critically reviewed the final draft. The manuscript has been read and approved by all the authors prior to submission.

Table 1. Distribution of assessment of adherence and MDI technique during outpatient visit for paediatric bronchial asthma.

	PRMTAC n (%)	No PRMTAC n (%)	χ^2	df	p-value
Assessment MDI technique			43.54	1	<0.001*
Not assessed	6 (15.4)	33 (84.6)			
Assessed	40 (87.0)	6 (13.0)			
Assessment of prophylactic adherence			0.002	1	0.962
No	16 (57.1)	12 (42.9)			
Yes	30 (57.7)	22 (42.3)			

Note: Pearson chi-square test.

Abbreviation: PRMTAC=Paediatric respiratory medication therapy adherence clinic.

*Statistically significant

Table 2. Simple and multiple logistic regression to determine associated factors to good asthma control.

Variable(s)	Poorly controlled		Good control		Crude OR (95% CI)	p-value ^a	Adj. OR (95% CI)	p-value ^b
	Mean (SD)	n (%)	Mean (SD)	n (%)				
Age	6.5 (3.32)		7.9 (2.90)		1.2 (1.0, 1.3)	0.045*	-	-
Age at diagnosis	5.7 (3.13)		6.0 (2.70)		1.1 (0.90, 1.22)	0.575	-	-
BMI (kgm ⁻²)	17.9 (7.17)		18.5 (13.57)		1.0 (0.96, 1.05)	0.803	-	-
Adherence						0.138	-	-
Low		20 (71.4)		8 (28.6)	1.0 (Ref.)			
Medium		5 (62.5)		3 (37.5)	1.5 (0.29, 7.81)			
High		9 (42.9)		12 (57.1)	3.33 (1.01, 10.97)			
Device						0.696	-	-
MDI		18 (54.5)		15 (45.5)	1.0 (Ref.)			
MDI/chamber		21 (50.0)		21 (50.0)	1.2 (0.48, 2.99)			
MDI technique						0.005*		0.045*
Not assessed		15 (36.6)		26 (63.4)	9.8 (2.47, 39.13)		13.0 (1.49, 113.25)	
Poor		17 (85.0)		3 (15.0)	1.0 (Ref.)		1.0 (Ref.)	
Good		8 (47.1)		9 (52.9)	6.4 (1.35, 30.14)		17.3 (1.75, 171.66)	
PRMTAC service						0.037*	-	-
Yes		29 (61.7)		18 (38.3)	1.0 (Ref.)			
No		12 (37.5)		20 (62.5)	2.7 (1.06, 6.78)			

Note: ^aSimple logistic regression; ^bMultiple logistic regression (Forward LR)

*Statistically significant

Table 3. Comparison of cumulative scores for the assessment of therapy adherence, counselling and interval symptoms between patients undergoing PRMTAC vs. no RMTAC.

Assessment cumulative score	PRMTAC Mean (SD)	No PRMTAC Mean (SD)	t	df	p-value ^a
Medication adherence	0.73 (0.40)	0.67 (0.40)	-0.679	72	0.499
Counselling	0.35 (0.17)	0.19 (0.08)	-5.765	64	<0.001*
Interval symptoms	1.00 (0.00)	0.71 (0.50)	-	-	<0.001* ^b

Note: ^aIndependent t-test; ^bMann Whitney U test (presented as median and interquartile range).

Cumulative score is determined by either presence (1 mark) or absence (0 mark) of each assessment item on each follow-up visit divided by the total number of follow-up visit for the year.

*Statistically significant

Table 4. Majority of patients were not assessed on MDI technique during routine outpatient medical paediatric visit without PRMTAC service.

Assessment of MDI technique	PRMTAC <i>n</i> (%)	No PRMTAC <i>n</i> (%)	Total no. of visit
Not assessed	10 (0.33)	83 (0.58)	93
Assessed	20 (0.67)	60 (0.42)	80
Total no. of visit	30 (100.0)	143 (100.0)	173

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